STATE OF MISSOURI
SEEKING PRIVATE PARTNERS FOR BROADBAND APPLICATION

Broadband is the great leveler of the 21st Century. With it, Missouri schoolchildren can access a wealth of knowledge from around the globe, and Missouri businesses can compete for new customers in virtually every country in the world. But, competition is a two-way street. Just as broadband allows Missouri businesses to compete in new markets around the world, it also allows businesses in Mumbai and Bangalore to compete for customers here in Hillsboro, Tipton, Joplin, Dexter and Rockport. Standing still in this environment is moving backwards. Just as steamships and railroads were the keys to becoming competitive in the 19th Century, and telephones and inter-state highways were the keys to remaining competitive in the 20th Century, Missouri must now make a quantum leap toward universal high-speed Internet access in order to compete in the global marketplace of the 21st Century.

Accordingly, the State of Missouri today announces its commitment to the creation of a robust, open-access, broadband backbone network constructed of state-of-the-art fiber optics that will connect every cluster of 50 or more dwellings, every county courthouse, school district, university, key law enforcement centers and other state facilities throughout Missouri. When this "MoBroadbandNow" infrastructure is complete, 95% of Missourians and Missouri businesses will have access to high-speed internet services at affordable rates. To bring this backbone into reality, the State intends to join forces with private entities, leveraging public and private resources to the advantage of both. But, where the interests or abilities of private corporations leave gaps in this backbone, the State will step up to bridge those gaps in order to ensure that the essential public policy of universal access remains paramount, and is not relegated to secondary importance by short-term market forces. Through this announcement, the State is asking for private partners to step up and help make this essential infrastructure development a reality. Private partners must be willing to establish a long-term relationship with the state for the planning, design, construction, and operation of this "middle mile" fiber optic broadband backbone.

With the MoBroadbandNow project, the State and its partners will create a point of Internet presence in communities around the State and defray the cost of delivering broadband Internet to rural, unserved, and underserved Missouri communities and citizens. With this backbone in place, the State will work with its partners to extend the Internet the "last mile" to Missouri homes and businesses. The

main advantages of the open-access MoBroadbandNow plan are that it will bring choice to consumers and make it cost-effective for private providers to reach isolated or disadvantaged customers.

This request for partners is in response to the Notice of Funds Availability (NOFA) issued on July 1, 2009 available at the following website:

http://broadbandusa.sc.egov.usda.gov/files/BB%20NOFA%20FINAL%20with%20disclaimer_1.pdf

The State wishes to identify partners willing and able to help achieve the State's objectives, meet the requirements of the NOFA, and submit a joint grant application by the August 14, 2009 deadline. Due to the complexity of the project and the time constraints of the grant application process, the State proposes a multi-step evaluation that includes shortlisting of possible private partners and continuous development and finalization of the requirements throughout. The goal is the ultimate development of a detailed network design and business plan from selected proposals meeting the NOFA criteria and submitted by the deadline.

All Notices of Interest in partnering with the State shall be submitted by 2:00 pm Monday, July 13, 2009 by one of the following methods:

- Via e-mail: To transform.broadbandinterest@mo.gov or to:
- Office of Administration
  Division of Purchasing
  Room 630
  Truman State Office Building
  Jefferson City, Missouri

Selection Process

Initial Screening

The State will employ a multi-step review process to identify and select possible partners. First, the State will conduct an initial screen of possible partners to determine the extent to which the partners meet the requirements for participation – see Notice of Interest form. The initial application to partner will provide appropriate information regarding technical experience and capabilities, preliminary information regarding network design and the business plan. This information is being sought quickly due to the complexity of the project and the time constraints of the grant application process. The State must determine the viability of the partner to meet the August 14th application deadline, the NOFA requirements, and ultimately construct and operate the network desired by the state. The application to partner will be

reviewed by a panel of individuals who have demonstrated subject-matter expertise. Based on the evaluation of the panel, applications to partner that are considered the most highly qualified will advance to the step two, “due diligence,” review for further consideration. All other applications to partner will be rejected, and the applicants will be notified in writing of the rejection.

Due Diligence Review

In step two of the review process, the remaining interested partners will be asked to submit additional information, as appropriate, such as more detailed plans or supporting documents to further substantiate the representations made in their notice to partner. The State expects to provide additional information and assistance to explain its plan and desires to the possible private partner. The State expects to discuss the terms and conditions necessary on the part of both parties to determine the feasibility of partnering for the application, construction, and operation of the network. The supplemental information will be reviewed and analyzed by the review panel with the support of external assistance as necessary to evaluate the consistency of the applications with the supporting documents and ensure applications merit awards. Private partners whose supporting documents do not adequately substantiate the representations in their notice of interest may be rejected at any time, and the partners will be notified in writing of the rejection. Upon completion of its due diligence, the State review panel will complete its analysis of each remaining notice to partner and recommend a single or multiple partners to the Commissioner of Administration. The private partners will be notified of the State’s interest in partnering in writing.

NOTICE OF INTEREST TO PARTNER
BROADBAND FEDERAL STIMULUS FUNDING OPPORTUNITY

Name of Firm:

Address:

Contact information:
Name of contact:
Position of contact:
Phone number:
E-mail:

NOFA funding category partner is interested in partnering with the state (check box):

USDA - RUS	
Last mile	
Grants to remote areas	
Loans/grants to non-remote	
Middle Mile - loans and loan/grant combinations	
DEPT. OF COMMERCE - NTIA	
BTOP	
Computing centers at libraries and community colleges	
Sustainable Adoption	
Mapping	

Brief description of the project of interest. Descriptions should be sufficiently detailed to demonstrate understanding of the NOFA goals and issues involved.

Describe Fiber Construction / Project Management Experience - entity services provided for, location, miles built, etc.

Describe Fiber Network Operations Experience and issues related thereto

Describe Cost Estimation Methodology - general planning model(s) for fiber construction in Missouri sufficient for the state to determine experience in accurately estimating fiber projects of this magnitude including what factors impact the estimates (positively or negatively).

Possible network design issues including thoughts regarding the state or alternative route maps, hut locations, factors that could impact the cost or design, and the implementation plan including time frames.

Possible business plan issues including thoughts regarding a business plan including addressing ownership and governance issues, sustainability issues, revenue models, pricing, operating in the public interest, last mile build out, and adoption.

Professional engineer's certification per NOFA:

	Yes	**No**
Possible by August 14 application (yes or no)		
For full state project		
For part of state project (provide information below on part)		
If after August 14 provide date that can be obtained	**Date**	
For full state project		
For part of state project (provide information below on part)		

Provide information on part of project that can achieve professional engineer's certification per NOFA by August 14, 2009.

Provide information on part of project that can achieve professional engineer's certification per NOFA after August 14, 2009.

STATE VISION AND SUPPORT

The Goals of this project include:

a. 95% of Missourians should have affordable high speed broadband access within five years.

b. The network will be designed to connect every school district, university, courthouse, law enforcement center, correctional center, and state facility that does not currently have adequate bandwidth within five years.

c. The “last mile” will be carried by fiber wherever feasible, and a combination of suitable technologies including wireless and cable, everywhere else that it is needed statewide within five years.

d. The network will be open-access, meaning that it will be available for use by all service providers on an equal basis.

e. The state will not operate the network as a going concern except insofar as it provides services to state and government facilities, universities, schools and libraries, but will instead partner with others to operate and maintain the network and provide services to Missourians.

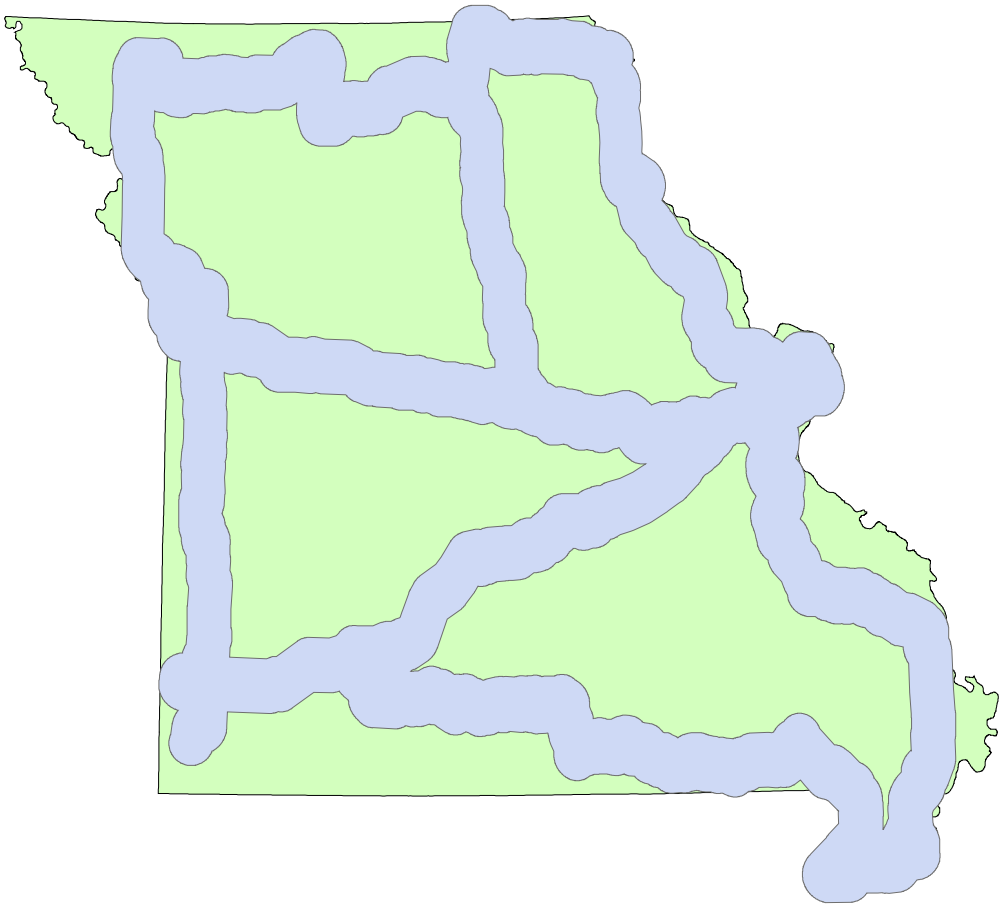
f. The network will bring choice to consumers and make it cost-effective to reach isolated or disadvantaged customers.

The State has an appropriation to support broadband technology opportunities of $225 million in the FY 2010 budget beginning July 1, 2009. The appropriation includes $185 million in possible grant funding from the federal government with the flexibility to accept and receive additional grant dollars that may be available. The appropriation also includes $40 million for expenses and possible matching for the federal funding. The appropriation assumes that all of the eligible grant components offered by the RUS and the NTIA could be covered

Desired State Network Design and Proposed Network

- The State of Missouri desires a network that connects the locations designated in Attachment 1 – Hut Locations for Broadband Backbone and ensures the most connectivity options statewide, to meet the long-term broadband needs of the state and citizens. In order to ensure that these goals are met, potential vendors are encouraged to look at what routes and options would best meet the mandatory design goals while offering the maximum flexibility and growth.

- The state has identified priority sites that it desires to connect to the network. To that end, the state has identified the corridor shown below as the primary corridor for connecting its sites and also to provide public access for a large share of the state's population. The state envisions that vendors will construct the network within 25 miles of either side of this primary corridor.



- The network is envisioned to be a middle-mile network, bridging the gap between local networks and the long-haul/access provider networks, typically accessed in Kansas City and St. Louis. The proposal should provide the optimal design for a network, passing through or near the required cities, and connecting as many locations as possible to the network.

- In order to meet these requirements, partner may assume that the State of Missouri is making available to the successful partner, the following assets:

    - Contractor will have access to all MODOT right of ways.

    - MODOT will provide sufficient resources to manage and expedite all right of way issues.

- Assistance with local permitting (county, city)
- Assistance with Federal permitting (Army Core of Engineers, etc.)
- Access to all towers owned by the Highway Patrol, Conservation and MoDOT.
- A mapping process operated by the University of Missouri

- The state has a goal of bringing high speed broadband access to 95% of Missourians within five years. Vendors should propose construction of one or more secondary corridors, separately priced, along any route proposed by the vendor to assist the state in achieving this goal.
- In the network proposed by the vendor for the primary or any secondary corridor the state requires that there be huts in intervals of no more than 60 km. The vendor should be cognizant of the state's interest in providing access to cities and population centers along the primary and any secondary corridor when designing the network.
- At a minimum, the private partner(s) will incur ***ALL*** costs for the fiber M&O for the entire network, including the M&O for the State and MOREnet.

Desirables:

- The contractor should make maximum use of these assets as well as any right-of-way, tower, and other infrastructure assets they already own to maximize the value of the network proposal.
  - Contractor should provide the state and MOREnet the right to use the contractor assets (RoW, tower, hut, etc.) for the duration of the IRU/contract at no cost.
  - Contractor should provide for unescorted access 24x7 in all contractor-owned huts and facilities proposed.
- The State and MOREnet desire the ability to acquire additional rack space at a hut at no additional cost.
- The State and MOREnet desire that there be no charge for the first 30A of -48VDC power (A+B feeds) delivered to each rack.
- The State and MOREnet desire that the contractor cap increases to all recurring costs at the Telecommunications CPI or the Power CPI as published by the US Dept. of Commerce.
- The State and MOREnet desire that some routes (KC Metro area, SL Metro area) have 144 or more strands of fiber.
- The State and MOREnet desire that the contractor provide no-cost access to all contractor-owned Right-of-Way, whether it is being used for the network or not.
- The State and MOREnet desire that the partner(s) provide a portion of the gross revenue derived from the sale of services on the proposed network.
- The State and MOREnet desire that all proposed huts be located within the corporate city limits (as applicable).
- The State and MOREnet desire that there be sufficient land acquired at each hut/POP location to be able to erect a 100' - 200' tower for wireless services (cellular, point-to-point or point-to-multipoint data) and site a hut for radio equipment.

- The State and MOREnet desire that the contractor place additional pedestals/cabinets at the direction of the state/MOREnet along the route at no additional cost.

- The State and MOREnet desire that the contractor provide services at no cost for the first 5 years (remote hands/eyes, limited troubleshooting, part replacement, part depoting) for equipment deployed by the State/MOREnet.

- The State and MOREnet desire that the contractor provide access at no cost to contractor's existing fiber infrastructure, towers, huts, etc. that are owned by the contractor. The value may be used as matching contribution for the ARRA grant.

- The State and MOREnet desire that the contractor provide wave services where available on the contractor's network at no cost. The value may be used as matching contribution for the ARRA grant.

2. FUNCTIONAL AND TECHNICAL SPECIFICATIONS AND REQUIREMENTS OF DESIRED NETWORK:

2.1 Project Specifications and Requirements:

2.1.1 The middle-mile broadband network shall connect all of the Required Cities and Hut Locations specified in Attachment 1.

2.1.2 Huts must be located within two miles of the coordinates given for each city.

2.1.3 In each of the cities listed in Attachment 1, the State requires one or more huts (except for Kansas City, St. Louis, and Springfield—the carrier hotel can be the hut) equipped as specified herein.

2.1.4 The required solution (fiber and hut spacing) must support DWDM transmission of 80 waves in the C-band at 10Gb/s per wave minimum, and the system must be designed for 40G and 100G speeds (fiber type, hut spacing).

2.1.5 Contractor must deliver all of the fibers assigned to the state and to MOREnet to a meet-me room in designated carrier hotels as of the date of installation.

a. Contractor is responsible for obtaining floor/rack space in the carrier hotels to terminate their portion of the fiber strands.

b. Contractor is responsible for obtaining access rights, duct, and whatever other materials, pathways, or permissions needed to terminate the fiber in the carrier hotels.

c. Contractor is not required to provide rack space in the carrier hotel(s) for the State or MOREnet to house equipment as part of this RFP.

2.1.6 Contractor must construct huts between the cities listed in Attachment 1 equipped no more than every 60km along the route.

a. Contractor’s hut locations should be such that a minimum number of huts are required on any proposed route.

b. Contractor hut locations should be within 5 miles of major cities and/or population centers along the proposed route to facilitate access to the proposed network.

2.1.7 In between all huts, the contractor must be capable and willing to cut and splice local drop fiber onto specified strands of the route.

a. Local drops should be made between huts at locations along the route such that as many communities as possible have access to services from the private provider and/or the state/MOREnet network(s). It is envisioned that these drops will consume a small number of the fiber strands between huts.

b. A local drop must consist of a minimum of 12 strands, 6 strands for each direction.

c. The state and/or MOREnet will specify where these drops are required along the proposed route after development of the preliminary design and before request of the detailed design.

d. At each state/MOREnet required drop point, the respondent must splice one pair of state/MOREnet fiber each direction to two pair of the drop fiber, creating a break in the path.

e. Contractor must provide a cabinet as described herein to house local vendor cross-connects and a small amount of equipment where specified by the state/MOREnet. At all other locations, the contractor can provide either a pedestal as described herein or a splice point, attached to a pole or in an underground vault for meet-me purposes.

2.1.8 The route, as designed, must be such that every hut/carrier hotel along the route is connected to a minimum of two other huts/carrier hotels.

2.1.9 All backbone routes must be physically separated by a minimum of 25' at all points.

2.1.10 All backbone routes must have separate building entrances into all huts and carrier hotels, with a minimum of two entrances per hut/hotel, separated by a minimum of 25'.

2.1.11 The contractor shall be required to acquire, deploy, and equip the private network with sufficient resources to provide a minimum of one (1) 1Gb – 10Gb service at locations on the network design specified by the state and provide sufficient capacity on the network to deliver local traffic back to one of the carrier hotels.

2.1.12 Contractor must be responsible for all operations as well as all ongoing operational and maintenance costs of the proposed equipment.

2.2 Fiber Plant Requirements

2.2.1 Contractor must construct the fiber routes with a minimum of 72 strands of fiber on all routes. 36 strands of fiber on all routes shall be reserved for use by the State of Missouri and MOREnet.

2.2.2 Fiber must be single-mode, either nondispersion-shifted fiber, ITU-T G.652 compliant, Corning SMF-28/SMF-28E or equivalent (preferred) or Non-Zero Dispersion Shifted Fiber (NZDSF), ITU G.655 compliant, Corning LEAF or equivalent.

2.2.3 All work must meet applicable code and requirements, including but not limited to:

a. Federal, State, and local code, statutes, and ordinances

b. NTIA/USDA specifications for telecommunications facilities

c. National Electrical Code

d. MoDOT Engineering Policy Guide (when in MoDOT Right of Way)

e. State specifications as listed in this RFP

f. Manufacturer's specifications

Where there is a conflict, vendor must document the conflict and propose a solution to the state project manager for approval.

2.2.4 All splices must be fusion-type splices with a maximum loss per splice of .30dB bi-directional average. Splices that do not meet this specification must be corrected at no cost to the state/MOREnet.

2.2.5 All fiber terminations must be SC.

2.2.6 All fibers, connectors, and patch panels must be clearly labeled.

2.2.7 Upon project completion, the contractor must supply two (2) copies of all of the actual manufacturer's specifications, documentation, warranty and related documentation (installation, operation, repair manuals, etc.) for all components of the fiber infrastructure (the fiber, patch panels, racks, huts, HVAC systems, power supplies, generator, etc.) at the completion of construction. Documentation must indicate the location(s) that the supplied information pertains to. This documentation may be provided electronically.

2.3 Huts, Collocation and Pedestals:

2.3.1 Contractor must provide suitable space for equipment at regular intervals along the proposed route. Whether the space is provided in an existing building, a specialized telecom facility ("carrier hotel"), or a hut/building specifically constructed for this project, the term 'hut' will be used to identify the space in this section. Additionally, at locations along the route where necessary, a drop to a pedestal or cabinet to provide a local POP connection to a community should be placed, generally close to existing splice points. The term 'pedestal' will be used to identify pedestals or cabinets in this section.

2.3.2 Contractor must construct huts or acquire collocation space along the proposed route. Each hut location must meet the following requirements:

a. Huts must be located every 60km or less along the route.

b. Huts must have dual HVAC (redundant systems).

c. Huts must have two independent power sources, one of which must be independent of the utility grid and able to operate for a minimum of 72 hours unattended (typically accomplished with a connection to the grid and a local generator).

d. Huts must have a 24x7 monitored security system with individually controlled access per authorized individual.

e. Huts must have convenience power outlets (120vAC, 20A) within 10' of assigned racks.

2.3.3 Contractor must provide two racks for the State and MOREnet's exclusive use in all huts. These racks must be provided at no cost to the State/MOREnet as part of the proposed network.

a. Racks must be 19" EIA, 84" tall minimum, 96" preferred.

b. When installed, racks must have a minimum of 36" clearance (front and rear) for equipment that is 30" in depth with 6" front protrusion, 24" rear protrusion.

c. Racks must have vertical cable management raceway between them (2" wide minimum).

d. Each rack must have 30A of power, -48v DC, A & B supplies.

e. Each rack must be equipped with a suitable PDU (ADC PWX-001RGCSD10PWDP or equivalent).

2.3.4 At each hut, the contractor must supply and install a 72 fiber SC patch panel to be installed in one rack to terminate the 36 east/36 west fibers. If there are more than two routes terminating in a particular hut, the contractor must add panels sufficient to house the fiber in increments of 72 ports.

2.3.5 At all huts, the contractor must supply and install a 'meet-me' vault for the state/MOREnet's exclusive use. Each meet-me vault must have:

a. Four 2" conduit (rigid or HDPE) or one 4" conduit (rigid) from the building to the vault set outside the building in an accessible location for 3rd party access.

b. Conduit must have a minimum of 18" sweeps on all bends, and must terminate adjacent to the racks provided for the state/MOREnet or suitable raceway/rack provided to bring additional fiber cables from the conduit terminus to the state/MOREnet racks.

c. Vaults must be a minimum of 24" x 36" and deep enough to permit the conduit to enter the vault 36" or more below grade. Frame and cover must meet applicable ASTM load requirements based on placement (H-20 minimum).

2.3.6 Contractor must provide a cabinet or pedestal at local drop locations for local community access to the fiber. Pedestals and cabinets must be NEC and RDUP approved.

a. Cabinets must have a 120VAC, 20A power supply from the utility grid.

b. Cabinets must be set on a concrete base with 2" PVC or HDPE conduit extending from the cabinet to vault(s) adjacent to the cabinet.

c. Cabinets must be a minimum of 18" deep, 42" high and 32" wide.

d. Cabinets must provide for mounting of optical splice closures, a minimum of 5 RU of electronics, space for a UPS, be lockable, weatherproof, and have suitable cooling (fans) to maintain the interior temperature +/- 5 degrees F of the exterior temperature.

e. Pedestals must be a minimum of 12" in diameter to allow for splice casings and bend requirements.

2.4 General Construction Specifications

2.4.1 Material:

a. Steel or PVC conduit shall be minimum schedule 40 wall thickness.

b. Any exposed steel conduit, brackets or hardware (e.g., bridge attachments) shall be hot-dipped galvanized after fabrication.

c. All split steel shall be flanged.

d. Vaults not in roadways shall have a minimum H-15 loading rating.

e. Vaults in roadways or driveways shall have a minimum H-20 loading rating.

f. Warning signs shall display universal do not dig symbol, "Warning-Buried Fiber-Optic Cable", company name and logo, local and emergency One Call toll-free numbers.

2.4.2 Minimum Depths: Minimum cover required in the placement of the conduit/cable shall be forty-two inches (42"), except in the following instances:

a. The minimum cover in ditches adjacent to roads, highways, railroads and interstates is forty-eight inches (48") below the clean out line or existing grade, whichever is greater.

b. The minimum cover across streams, river washes, and other waterways shall be sixty inches (60") below the clean out line or existing grade, whichever is greater.

c. At locations where the cable crosses other subsurface utilities or other structures, the cable/conduit shall be installed to provide a minimum of twelve inches (12") of vertical clearance from the utility/obstacle. The cable/conduit can be placed above the utility/obstacle, provided the minimum clearance and applicable minimum depth can be maintained; otherwise the cable/conduit shall be installed under the existing utility or other structure.

d. In rock, the cable/conduit shall be placed to provide a minimum of eighteen inches (18") below the surface of the solid rock, or provide a minimum of forty-two inches (42") of total cover, whichever requires the least rock excavation.

e. Where existing pipe is used, current depth is sufficient.

2.4.3 Buried Cable Warning Tape: All cable/conduit shall be installed with buried cable warning tape. The warning tape shall be:

a. laid a minimum of twelve inches (12") above the cable/conduit

b. generally placed at a depth of twenty-four inches (24") below grade and directly above the cable/conduit

c. a minimum of three inches (3") wide and display "Warning-Buried Fiber-Optic Cable," a company name, logo and emergency one-call toll-free number repeated every twenty-four inches (24").

2.4.4 Conduit Construction: Conduits may be placed by means of trenching, plowing, jack and bore, multi-directional bore or directional bore. Conduits shall generally be placed on a level grade parallel to the surface, with only gradual changes in grade elevation. Steel conduit shall be joined with threaded collars, Zap-Lok or welding. (Welding is the preferred method.)

a. All jack and bores shall use HDPE or steel conduit.

b. All directional or mini-directional bores shall use HDPE or steel conduit.

c. Any cable placed in swamp or wetland areas shall be placed in HDPE, PVC, or steel conduit.

d. Where required by the permitting agency:
   1) all crossings of paved city, county, state, federal, and interstate highways, or railroad crossings shall be encased in steel conduit,
   2) all longitudinal cable runs under paved streets shall be placed in steel or concrete encased PVC conduit,
   3) all cable placed in metropolitan areas shall be placed in steel or concrete covered PVC conduit, and
   4) at all foreign utility/underground obstacle crossings, steel conduit shall be placed and shall extend at least five feet (5') beyond the outer limits of the obstacle in both directions.

2.4.5 Innerduct Installation:

a. No cable shall be placed directly in any split/solid steel conduit without innerduct.

b. Innerduct(s) shall extend beyond the end of all conduits a minimum of eighteen inches (18").

2.4.6 Cable Installation in Conduit:

a. The cable shall be installed using either a sealed pneumatic cable blowing system or a powered pulling winch and hydraulic powered assist pulling wheels.

b. The maximum pulling force to be applied to the cable shall be six hundred pounds (600 lbs.).

c. Sufficient pulling assists shall be available and used to insure the maximum pulling force is not exceeded at any point along the pull.

d. The cable shall be lubricated at the reel and all pulling assist locations.

e. A pulling swivel breakaway rated at six hundred pounds (600 lbs.) shall be used at all times.

f. Splices shall be allowed only at planned junctions and reel ends.

g. All splices shall be contained in a vault.

h. A minimum of twenty meters (20m) of slack cable shall be left in all intermediate vaults.

i. A minimum of thirty meters (30m) of slack cable shall be left in all splice locations.

j. A minimum of fifty meters (50m) of slack cable shall be left in Transmission Sites and points of presence.

k. PVC conduit/innerduct may be split, with the cable installed inside the split duct and plowed in.

2.4.7 Vaults:

a. Vaults shall be placed in traveled surface streets and shall have locking lids.

b. Vaults shall be placed in all other areas, and be installed with a minimum of eighteen inches (18") of soil covering lid.

2.4.8 EMS Markers:

a. EMS Markers shall be placed directly above the lid of all buried vaults or shall be fabricated into the lids of the vaults.

2.4.9 Cable Markers (Warning Signs):

a. Cable markers shall be installed at all changes in cable running line direction, splices, pull boxes, assist-pulling locations, and at both sides of street, highway or railroad crossings.

b. Markers shall be spaced at intervals of no more than five hundred feet (500') apart in metropolitan areas (areas where there is either extensive development and improvement or rapid growth (new building construction)) and within line of sight (not to exceed one thousand feet (1,000')) in non-metropolitan areas.

c. Markers shall be positioned so that they can be seen from the location of the cable and generally set facing perpendicular to the cable running line.

d. Splices and pull boxes shall be marked on the cable marker post.

2.5 Fiber Splicing, Testing, and Acceptance Standards and Procedures:

2.5.1 End-to-End Testing:

a. After the contractor has established end-to-end connectivity on the Fibers during initial construction, the contractor shall:
   1) perform bi-directional optical time domain reflectometer ("OTDR") end-to-end tests to record splice loss measurements,
   2) test continuity to confirm that no fibers have been "frogged" or crossed at any splice points, and
   3) record loss measurements using a light source and a power meter.

b. At Fiber termination points, the pigtail splice loss shall be less than 1.0 dB, and the reflection level at such termination points shall be less than –50dB.

c. When a Fiber has been spliced, the splice loss shall not be greater a .30 dB bi-directional averaged loss.

d. When a Fiber on a Span has been spliced, the average of the bi-directional splice loss on the Span shall not be greater than .15 dB.

e. Contractor shall perform the bi-directional end-to-end testing at 1550 nm. The results of such tests for any given Span shall not be deemed within specification unless showing loss measurements between fiber distribution panels at each end of such Span in accordance with the loss specifications set forth by the cable manufacturer's specifications for dB per kilometer loss. Contractor shall measure and verify losses for each splice point in both

directions and average the loss values. Contractor shall mark any splice points as Out-of-Spec ("OOS") that have an average loss value, based on bi-directional OTDR testing, in excess of 0.3 dB. However, the .3 dB loss spec does not apply to fibers that are being spliced that have different mode-fields. Splice loss may be higher due to the mode-field mismatch. Any such splice points shall be subject to requirements herein.

2.5.2 Post-Construction Testing:

a. After performing permanent splicing (in conjunction with repair of a cable cut, replacement of a segment of cable, or other work after initial installation and splicing of the cable), the test procedures set forth herein shall apply to the relevant fibers and cable segments. Contractor may, after the Acceptance Date, adopt any alternative methods of testing that are generally accepted in the industry and that provide sufficient data to fulfill the objectives of the tests set forth in this RFP.

2.5.3 Out-of-Spec Splices:

a. OOS splices shall be noted, but shall not preclude Acceptance of a fiber if the OOS condition does not affect transmission capability (based on use of then-prevailing telecommunications industry standards applicable to equipment generally used with the relevant type of fiber) or create a significant possibility of an outage. In the event the state/MOREnet is later able to reasonably establish that the OOS splice affects service, the contractor shall take necessary action to bring the splice into compliance with the applicable specifications of this RFP.

2.5.4 OTDR Equipment and Settings:

a. Contractor shall use OTDR equipment and settings that are, in its reasonable opinion, suitable for performing accurate measurements of the fiber installed. Such equipment and settings shall include, without limitation, the Laser Precision CMA4000 models and compatible models for OTDR testing, and the following settings:

Index of refraction settings:	1310 nm	1550 nm
Lucent Truwave (Classic and RS)	1.4707	1.4701
Corning SMF-28	1.4675	1.4681
Corning SMF-LS	1.471	1.470
Corning LEAF	N/A	1.469
Corning MetroCore	N/A	1.469
Sumitomo Fiber	1.467	1.467

b. For tests of a pigtail connector and its associated splice:

CMA4000	4 km Range
50ns Pulse	1 m Resolution

2.5.5 Acceptance Test Deliverables:

a. Contractor shall provide computer media (CD-ROM) and or hard copies containing the following information for the relevant fibers and cable segments.

1) Verification of end-to-end fiber continuity with power level readings for each fiber taken with a stable light source and power meter.

2) Verification that the loss at each splice point is in accordance with the requirements herein.

3) The final bi-directional OTDR test data, with distances.

4) The precise route (including GPS points) of the fiber, the cable manufacturer, reel number, cable type (buffer/ribbon), fiber type, number of fibers, and manufacture date of all fiber used.

b. The contractor must also supply all necessary software required to view, print and export the test results.

2.5.6 Fiber Characterization:

a. Contractor must provide fiber characterization of four strands of fiber for use by the state/MOREnet.

b. Characterization must include the following tests, and the results of the tests provided to the state/MOREnet electronically:

1) OTDR fiber trace, showing the total distance and listing all splices (distance, loss (dB), reflectance (dB), slope (dB/km), and total loss (accumulate) in dB.

2) Dispersion testing, showing the delay (ps/km) and dispersion (ps/nm) of the fiber segment at all wavelengths between 1530nm and 1565nm in 1nm increments.

3) PMD testing, showing the PMD for the fiber at frequencies from 1435nm to 1640nm. Tests must include the PMD delay (ps), PMD Coefficient (ps/km½), PMD2 delay (ps/nm) and PMD2 coefficient (PS/nm.km).

c. The contractor must also supply all necessary software required to view, print and export the characterization test results.

2.6 As-Built Drawing Specifications:

2.6.1 Alignment Sheets:

a. As-Built Alignment Sheets shall include:
1) survey information (either from existing data or new information)
2) cable and conduit information
3) splice locations
4) assist point locations with permanent structures
5) survey stations
6) Transmission Site locations
7) All huts, vaults, cabinets, and pedestals
8) Location (GPS) and type of EMS markers used on the route

b. As-Built Alignment Sheets shall be updated with actual construction field data. The scale of As-Built Alignment Sheets shall not exceed 1” = 200’ in metropolitan areas (areas where there is either extensive development and improvement or rapid growth (new building construction)) or 1” = 500’ in non-metropolitan areas. Detail sheets should be used to provide information on specific elements (i.e. a hut) that do not require high-detail for the entire area.

2.6.2 Format:

a. Drawings shall be "blue lines”, as such term is understood in the industry. Contractor may, after the Acceptance Date, adopt any replacement method of creating or providing drawings that is generally accepted in the industry and that provides equivalent information.

b. Drawings must be provided in AutoCAD format and/or GIS format. State/MOREnet prefers AutoCAD .DWG files and ESRI ArcGIS files (.gdb containing points, lines, and polygons).

3. PARTNERSHIP PERIOD:

3.1.1 The State envisions an original partnership period of ten (10) years with possible renewal cycles of succeeding ten years.

Attachment 1
Hut Locations for Broadband Backbone

Respondent must propose huts within 2 miles of the following locations:

Bonne Terre	37°55.456'	-90°30.953'	Lees Summit	38 °54.604'	-94°27.057'
Boonville	38°58.673'	-92°44.003'	Licking	37°30.2 41'	-91°52.428'
Bowling Green	39°22.162'	-91°13.336'	Linn	38°27. 974'	-91°48.772'
Cameron	39°45.842'	-94°13.726'	Maryville	40°20.9 05'	-94°50.855'
Cape Girardeau	37°18.887'	-89°31.691'	Mineral Poi nt	37°56.175'	-90°44.212'
Charleston	36°53.661'	-89°20.935'	Moberly	39°23. 636'	-92°26.901'
Chillicothe	39°48.259'	-93°32.559'	Neosho	36°48. 712'	-94°21.782'
Columbia	38°56.366'	-92°19.286'	Pacific	38°30.34 8'	-90°37.617'
Cottleville	38°45.555'	-90°38.213'	Park Hills	37° 50.772'	-90°30.809'
Farmington	37°46.376'	-90°26.218'	Poplar Bluff	36 °46.484'	-90°25.895'
Fordland	37°9.525'	-92°52.218'	Rolla	37°57.163'	-91°46.591'
Fulton	38°50.721'	-91°55.450'	Sedalia	38°41.949'	-93°16.177'
Hillsboro	38°15.507'	-90°33.324'	Springfield	37° 12.551'	-93°17.410'
Independence	39°5.018'	-94°20.453'	St. Joseph	39° 45.559'	-94°47.147'
Jefferson City	38°33.540'	-92°6.672'	St. Louis	38 °37.533'	-90°11.724'
Joplin	37°5.887'	-94°27.907'	St. Louis	38°41.129 '	-90°21.275'
Kansas City	39°6.051'	-94°34.869'	Tipton	38°40.0 21'	-92°46.814'
Kansas City	39°4.164'	-94°35.670'	Trenton	40°4.6 64'	-93°37.002'
Kansas City	39°8.409'	-94°30.209'	Union	38°24.77 3'	-90°57.606'
Kansas City	39°14.862'	-94°32.876'	Vandalia	39°1 9.077'	-91°28.472'
Kansas City	39°2.087'	-94°34.659'	Warrensburg	38° 45.614'	-93°44.294'
Kirksville	40°11.181'	-92°34.858'	West Plains	36° 43.757'	-91°51.404'

The State/MOREnet requires that the backbone route include (at a minimum) the following carrier hotels:

900 Walnut, St. Louis 1102 Grand, Kansas City Woodruff Building, Springfield